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Eyal M. Aronoff

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EXAMINER

CHEN, CHONGSHAN

ART UNIT

PAPER NUMBER

2172

DATE MAILED: 03/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/782,586

Applicant(s)

ARONOFF ET AL.

Examiner

Chongshan Chen

Art Unit

2172

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Information Disclosure Statement*

1. The reference cited in the IDS, PTO-1449, Paper No. 6, has been considered.

### *Response to Arguments*

2. Applicant's arguments filed on 22 December 2003 have been fully considered but they are not persuasive.
3. As per applicant's arguments regarding the references do not disclose a reconcile process that purges transactions from transaction-level queues when the transactions have already been applied have been considered but are not persuasive. In the previous rejection, the examiner took official notice it is obvious to purge transactions when the transactions have already been applied. The examiner maintains the rejection that is well known in the art to purge transactions from queue when the transactions have already been applied, please see Pereira, 6,122,640, column 8, lines 21-35.
4. As per applicant's arguments regarding Lomet does not teach a reconcile process that monitors which transactions have been applied to the target system during recovery of the target system have been considered but are not persuasive. Lomet teaches a recovery manager replays transactions from a log during recovery of a system. If the recovery manager does not monitor which transactions have been applied to the target system during the recovery, then the recovery manager will execute all the transactions in the log over and over, never stop because it will not know which transaction is already applied and when the recovery is finished. Obviously, the recovery process does not run forever, it stops after it is done. Therefore, the recovery manager

clearly monitors which transactions have been applied to the target system during the recovery so that the recovery manager knows which is the next transaction to be executed after executing one transaction and when to stop the process when all the transactions are executed.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-25 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parker (6,289,357) in view of Lomet (6,151,607).

As per claim 1, Parker discloses a device for performing replication between a source system and a target system, the device comprising:

a source system having data files, and log files storing transactions corresponding to changes made to the data files (Parker, Fig. 1A, 23, Source Dataset, 14, Log File Xmit, 18, Log Receive, col. 2, line 63 - col. 3, line 27);

a target system (Parker, Fig. 1A, 24, Target Dataset); and

a replication system performing replication of at least portions of the data files of the source system to the target system by reading the log files and posting the changes from the log files to the target system (Parker, col. 3, lines 28-33).

Parker does not explicitly disclose transaction-level poster queues, each poster queue storing statements corresponding to a particular transaction from the source system, and a

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reconcile process which purges transactions from the poster queues when the transactions have already been applied to the target system during recovery of the target system. Lomet discloses queue storing statements corresponding to a particular transaction from the source system, and replaying operations from an identified point in the log (Lomet, Fig. 24 & 25, col. 8, lines 60-67). Lomet does not explicitly disclose deleting transaction before the identified point in the log. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to delete transactions before the identified point in the log in order to save storage space since the transactions before the identified point are already applied to the target system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Parker with Lomet in order to identify a point in the log to begin replaying operations during recovery.

As per claim 2, Parker and Lomet teach all the claimed subject matters as discussed in claim 1, and further disclose:

poster queues which store information corresponding to changes made to at least portions of a source system (Parker, Fig. 1, Lomet, Fig. 24 & 25);

at least one poster process which reads the information stored in the poster queues and generates commands interpretable by a target system and designed to change the target system to reflect the changes made to the at least portions of the source system (Parker, Fig. 1).

Parker does not explicitly disclose a reconcile process which purges stale information stored in the poster queues, the stale information corresponding to changes made to the target system during the instantiation or recovery thereof. Lomet discloses replaying operations from an identified point in the log (Lomet, Fig. 24 & 25, col. 8, lines 60-67). It would have been

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obvious to one of ordinary skill in the art at the time the invention was made to delete transactions before the identified point in the log in order to save storage space since the transactions before the identified point are already applied to the target system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Parker with Lomet in order to identify a point in the log to begin replaying operations during recovery.

As per claim 3, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose the information comprises transactions (Parker, col. 2, line 63 - col. 3, line 33).

As per claim 4, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose the at least one poster process reads a completion indicator from the poster queues, wherein the completion indicator corresponds to one or more finalized changes made to the source system (Parker, Fig. 1).

As per claim 5, Parker and Lomet teach all the claimed subject matters as discussed in claim 4, and further disclose performing operations on the source dataset and synchronizing the source and target dataset (Parker, Fig. 1), which inherently includes a COMMIT statement.

As per claim 6, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose the reconcile process employs placement indicators to determine which information stored in the poster queues is stale (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 7, Parker and Lomet teach all the claimed subject matters as discussed in claim 6, and further disclose one of the placement indicators corresponds to a recovery marker placed by the target system, wherein the recovery marker identifies how much of the information

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the target system already applied during recovery thereof (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 8, Parker and Lomet teach all the claimed subject matters as discussed in claim 6, and further disclose one of the placement indicators corresponds to a particular portion of the information (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 9, Parker and Lomet teach all the claimed subject matters as discussed in claim 6, and further disclose each placement indicator comprises a sequence number identifying a log file where a particular portion of the information originated (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 10, Parker and Lomet teach all the claimed subject matters as discussed in claim 6, and further disclose each placement indicator comprises a displacement number identifying the displacement within a log file where a particular portion of the information originated (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 11, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose performing operations on the source dataset and synchronizing the source and target dataset (Parker, Fig. 1), which inherently includes a reader process which reads the information from the source system.

As per claim 12, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose performing operations on the source dataset and synchronizing the source and target dataset (Parker, Fig. 1), which inherently includes a reader queue which stores information read from the source system.

As per claim 13, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose the replication includes mirroring at least portions of the source system on at least one target system (Parker, Fig. 1).

As per claim 14, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose performing operations on the source dataset and synchronizing the source and target dataset (Parker, Fig. 1), which inherently includes load balancing functions based on one of software and hardware configurations of the source and target systems.

As per claim 15, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose the replication provides broadcast functions (Parker, Fig. 1).

As per claim 16, Parker and Lomet teach all the claimed subject matters as discussed in claim 2, and further disclose performing operations on the source dataset and synchronizing the source and target dataset (Parker, Fig. 1), which inherently includes consolidation functions.

As per claim 17, Parker discloses a method of recovering or instantiating a target database during replication from a source database to the target database, the method comprising:  
creating a copy of data from a source database (Parker, Fig. 1A);  
recovering the copy (Parker, col. 2, line 63 - col. 3, line 27).

Parker does not explicitly disclose reconciling information contained in a replication system with information stored in the recovered copy, thereby purging stale transactions from the replication system. Lomet discloses queue storing statements corresponding to a particular transaction from the source system, and replaying operations from an identified point in the log (Lomet, Fig. 24 & 25, col. 8, lines 60-67). Lomet does not explicitly disclose deleting transaction before the identified point in the log. However, it would have been obvious to one of

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ordinary skill in the art at the time the invention was made to delete transactions before the identified point in the log in order to save storage space since the transactions before the identified point are already applied to the target system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Parker with Lomet in order to identify a point in the log to begin replaying operations during recovery.

As per claim 18, Parker and Lomet teach all the claimed subject matters as discussed in claim 17, and further disclose restarting replication (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 19, Parker and Lomet teach all the claimed subject matters as discussed in claim 18, and further disclose the restarting of the replication includes restarting at least one poster process (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 20, Parker and Lomet teach all the claimed subject matters as discussed in claim 18, and further disclose the restarting of the replication includes rolling forward at least some of the information rolled back during the recovery of the copy (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 21, Parker and Lomet teach all the claimed subject matters as discussed in claim 17, and further disclose employing a hot backup mode of a database management system of the source database (Parker, Fig. 1).

As per claim 22, Parker and Lomet teach all the claimed subject matters as discussed in claim 17, and further disclose employing a database management system associated with the copy (Parker, Fig. 1).

As per claim 23, Parker and Lomet teach all the claimed subject matters as discussed in claim 17, and further disclose placing a recovery marker in the recovered copy, thereby identifying a recovery position therein (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 24, Parker and Lomet teach all the claimed subject matters as discussed in claim 23, and further disclose the placement of the recovery marker occurs substantially near the end of recovering the copy (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 25, Parker and Lomet teach all the claimed subject matters as discussed in claim 23, except for explicitly disclosing the reconciling finds the recovery marker and the stale transactions of the information correspond to those transactions that were completed on the source system before the placement of the recovery marker. Lomet discloses replaying operations from an identified point in the log (Lomet, Fig. 24 & 25, col. 8, lines 60-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to delete transactions before the identified point in the log in order to save storage space since the transactions before the identified point are already applied to the target system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Parker with Lomet in order to identify a point in the log to begin replaying operations during recovery.

As per claim 34, Parker discloses a device comprising:

a source system having a source database management system (SDBMS) which governs the storage of data within the source system and creates a log file tracking changes made to the source system (Parker, Fig. 1);

a target system having a target database management system (TDBMS) which governs the storage of data within the target system and creates a log file tracking the changes made to the target system (Parker, Fig. 1).

Parker does not explicitly disclose a replication system having queues and communicating with the log file of the TDBMS and the log file of the SDBMS, thereby purging from the queues transactions applied after the beginning, but before the completion, of the recovery or instantiation of the target system, wherein the transactions correspond to the changes made to the source system. Lomet discloses queue storing statements corresponding to a particular transaction from the source system, and replaying operations from an identified point in the log (Lomet, Fig. 24 & 25, col. 8, lines 60-67). Lomet does not explicitly disclose deleting transaction before the identified point in the log. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to delete transactions before the identified point in the log in order to save storage space since the transactions before the identified point are already applied to the target system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Parker with Lomet in order to identify a point in the log to begin replaying operations during recovery.

7. Claims 26-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lomet (6,151,607).

As per claim 26, Lomet discloses a method of reconciling transactional information stored in a replication system with a recovered database, the method comprising:

parsing a log file of a recovered database to determine a placement indicator of a recovery flag (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

reading transaction data corresponding to changes made to a source database to determine placement indicators of completed transactions (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

Lomet does not explicitly disclose purging the transactional data when the placement indicator corresponding to the completed transaction occurred before the placement indicator of the recovery flag. However, Lomet discloses replaying operations from an identified point in the log (Lomet, Fig. 24 & 25, col. 8, lines 60-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to delete transactions before the identified point in the log in order to save storage space since the transactions before the identified point are already applied to the target system.

As per claim 27, Lomet teaches all the claimed subject matters as discussed in claim 26, and further discloses the transaction data is read from the source database (Lomet, Fig. 3).

As per claim 28, Lomet teaches all the claimed subject matters as discussed in claim 26, and further discloses a sequence number of a log file of the source database (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 29, Lomet teaches all the claimed subject matters as discussed in claim 28, and further discloses the sequence number uniquely identifies the log file (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 30, Lomet teaches all the claimed subject matters as discussed in claim 26, and further discloses the placement indicator of the recovery flag comprises a sequence number of a log file of the recovered database (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 31, Lomet teaches all the claimed subject matters as discussed in claim 30, and further discloses the sequence number uniquely identifies the log file (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 32, Lomet teaches all the claimed subject matters as discussed in claim 26, and further discloses the placement indicator comprises a displacement within a log file (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

As per claim 33, Lomet teaches all the claimed subject matters as discussed in claim 26, and further discloses the recovery flag is placed by a database management system of the recovered database (Lomet, Fig. 24 & 25, col. 8, lines 60-67).

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chongshan Chen whose telephone number is 703-305-8319. The examiner can normally be reached on Monday - Friday (8:00 am - 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Breene can be reached on (703)305-9790. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

March 4, 2004

  
SHAHID ALAM  
PRIMARY EXAMINER